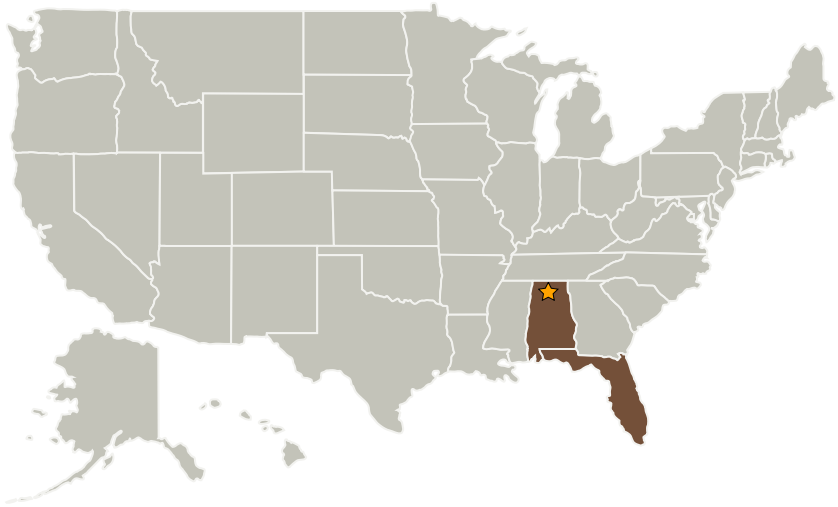
Thermal Stir Welding of High Strength and High Temperature Alloys for Aerospace Applications, Phase I

Completed Technology Project (2009 - 2010)

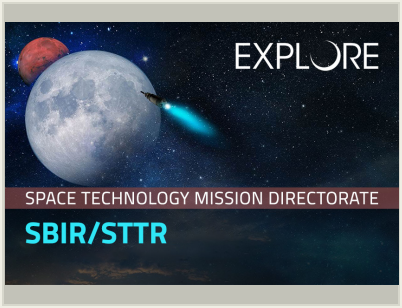
Project Introduction

The Keystone and MSU team propose to demonstrate the feasibility of solid-state joining high strength and temperature alloys utilizing the Thermal Stir Welding process. The alloy selected for this proposed effort is Haynes 230; the alloy of choice typically utilized in rocket engine nozzel skirts. This class of alloys is difficult to fusion weld and has not been shown weldable by friction stir methods. Thus, the Keystone team is proposing to utilize the Thermal Stir Welding process; a solid-state welding process that decouples the stirring and heating features of the process to enable optimization of each key parameter. By independently controlling and optimizing these two process parameters, the best metal working parameters can be identified and utilized to plasticize and stir the Haynes 230 alloy to achieve solid-state welding. Achievement of this objective will enable superior mechanical properties in the weld joint and thus maximize the capability of the weld for the intended application.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
Keystone Synergistic Enterprises, Inc.	Supporting Organization	Industry	Port Saint Lucie, Florida



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Primary U.S. Work Locations	
Alabama	Florida

Project Transitions

January 2009: Project Start

January 2010: Closed out

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Bryant H Walker

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.1 Materials
    - TX12.1.8 Smart Materials